TECHNICAL DATA SHEET | AUSTRALIAN SI FORMAT

KGCL-L Laminated GCL

Reinforced sodium-bentonite GCL with factory-laminated polyethylene barrier

KGCL-L20A to KGCL-L100C • Issue 0 - Revision M - Technical approval issue • 10 August 2026

Product description. KGCL-L is a needle-punched, reinforced GCL comprising a polypropylene nonwoven cap, dry granular sodium-bentonite core, polypropylene woven carrier and a discrete polyethylene laminate bonded to the upper nonwoven face. One 300 mm-wide longitudinal receiver edge is intentionally left unlaminated. During production, powdered sodium bentonite is mechanically impregnated across a 500 mm-wide lower-panel zone at 400 g per lineal metre (800 g/m²), covering the full overlap and extending 200 mm inboard. Three longitudinal release/locking cuts are formed through the lower receiver layer into the granular core. The adjoining fully laminated edge is installed above it so its woven underside contacts the exposed lower nonwoven. When hydrated and confined, embedded powder and granular core bentonite migrate upward through the lower-panel cuts beneath continuous upper-panel polyethylene coverage.

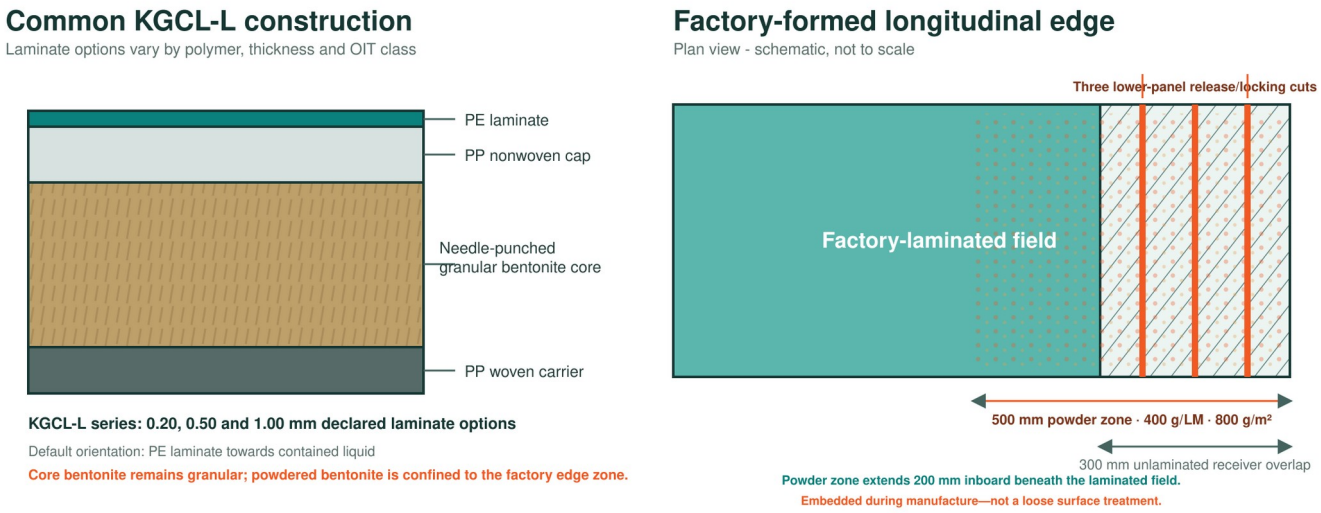

Figure 1. Common KGCL-L construction and factory-formed receiver-edge configuration.

A laminate

LDPE; standard OIT at least 60 minutes. Declared at 0.20, 0.50 and 1.00 mm.

B laminate

LLDPE; standard OIT at least 100 minutes. Declared at 0.50 and 1.00 mm.

C laminate

Enhanced-stabilised LLDPE; standard OIT, HP-OIT and 90-day retention declared. Available at 0.50 and 1.00 mm.

Factory overlap

A 300 mm receiver overlap is supported by a 500 mm lower-panel powder zone and three lower-panel cuts beneath continuous upper-panel PE.

Evidence basis

KGCL-L values in this issue are limited to the revised manufacturer data sheet supplied on 5 August 2026. GRI-GCL3 values are external comparison criteria only and are not substituted as KGCL-L product values. Order-specific certificates remain required.

Common GCL construction properties

The common GCL values apply to every laminate code in this TDS. Values are minimum average roll values (MARV), except moisture content, fluid loss, permeability and index flux, which are stated as maxima. GRI-GCL3 Rev. 5 is shown for direct comparison.

Clay and component geosynthetics

Property	Test method	Unit	KGCL-L declared	GRI-GCL3 GM-GF	GRI MQC frequency
Bentonite swell index	ASTM D5890	mL/2 g	**≥ 24**	≥ 24	1 per 50 t
Bentonite fluid loss	ASTM D5891	mL	**≤ 18**	≤ 18	1 per 50 t
Upper nonwoven PP mass	ASTM D5261	g/m²	**> 200**	≥ 200	1 per 20,000 m²
Woven PP carrier mass	ASTM D5261	g/m²	**≥ 110**	≥ 100	1 per 20,000 m²

Finished laminated GCL

Property	Test method	Unit	KGCL-L declared	GRI-GCL3 GM-GF	GRI MQC frequency
Dry bentonite mass	ASTM D5993	g/m²	**≥ 3,700**	≥ 3,700	1 per 4,000 m²
Calculated dry component mass - laminated field*	Component sum	g/m²	**> 4,194 to > 4,930 by code**	≥ 4,100	1 per 4,000 m²
Initial moisture content	ASTM D5993	%	**≤ 35**	≤ 35	1 per 4,000 m²
Tensile strength - MD	ASTM D6768	kN/m	**≥ 11.0**	≥ 4.0	1 per 20,000 m²
Peel strength - MD	ASTM D6496	N/m	**≥ 360**	≥ 360	1 per 4,000 m²
CBR puncture resistance	EN ISO 12236	N	**≥ 1,800**	Not specified	Not specified

Hydraulic index properties - unlaminated GCL core

Property	Test method	Unit	KGCL-L declared	GRI-GCL3 GM-GF	GRI MQC frequency
Core permeability	ASTM D5887	m/s	**≤ 5×10^{-11}**	Not specified for GM-GF	Not specified
Core index flux	ASTM D5887	m³/m²/s	**≤ 1×10^{-8}**	Not specified for GM-GF	Not specified

**Calculated from the declared lower-bound dry bentonite and geotextile component masses plus laminate density and nominal thickness. See the product-code matrix for each laminate. The 300 mm factory-unlaminated receiver edge retains a calculated dry component mass of > 4,010 g/m² without laminate. No GRI-GCL3 value has been adopted as a KGCL-L product value. Bentonite mineralogy, carbonate content, cation exchange capacity and particle-size distribution require separate evidence where specified.*

Laminate options and product codes

The number in the product code is nominal laminate thickness in hundredths of a millimetre: 20 = 0.20 mm, 50 = 0.50 mm and 100 = 1.00 mm. The final letter identifies polymer and stabilisation family. Only combinations declared in the supplied manufacturer sheet are listed.

Product code	Polymer	Nominal thickness	Declared stabilisation evidence
KGCL-L20A	LDPE	0.20 mm	Standard OIT ≥ 60 min
KGCL-L50A	LDPE	0.50 mm	Standard OIT ≥ 60 min
KGCL-L100A	LDPE	1.00 mm	Standard OIT ≥ 60 min
KGCL-L50B	LLDPE	0.50 mm	Standard OIT ≥ 100 min
KGCL-L100B	LLDPE	1.00 mm	Standard OIT ≥ 100 min
KGCL-L50C	LLDPE	0.50 mm	Standard OIT ≥ 100 min; HP-OIT ≥ 400 min; oven-ageing retention declared
KGCL-L100C	LLDPE	1.00 mm	Standard OIT ≥ 100 min; HP-OIT ≥ 400 min; oven-ageing retention declared

Declared laminate performance

Property	L20A	L50A	L100A	L50B	L100B	L50C	L100C
Thickness, ASTM D5199 (mm)	0.20	0.50	1.00	0.50	1.00	0.50	1.00
Density, ASTM D1505 (g/cm³)	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Calculated minimum dry component mass - laminated field (g/m²)**	> 4,194	> 4,470	> 4,930	> 4,470	> 4,930	> 4,470	> 4,930
Break strength, ASTM D6693 (kN/m)*	4	9	19	13	27	13	27
Standard OIT, ASTM D8117 (min)	≥ 60	≥ 60	≥ 60	≥ 100	≥ 100	≥ 100	≥ 100
High-pressure OIT, ASTM D5885 (min)	ND	ND	ND	ND	ND	≥ 400	≥ 400
Standard OIT retained after 90 d at 85 °C (%)	ND	ND	ND	ND	ND	≥ 35	≥ 35
HP-OIT retained after 90 d at 85 °C (%)	ND	ND	ND	ND	ND	≥ 60	≥ 60

*ND = not declared in the supplied manufacturer data sheet. *The source sheet labels break-strength units as kN/mm; values are shown here as kN/m, consistent with ASTM D6693 reporting and engineering dimensional convention. Confirm the corrected unit on the order-specific laminate certificate. **Calculated from lower-bound components: ≥ 3,700 g/m² dry bentonite, > 200 g/m² upper nonwoven and ≥ 110 g/m² woven carrier, plus 0.92 × 1,000 × nominal laminate thickness (mm). Values apply to the laminated field and are not measured ASTM D5993 finished-mass results.*

Code control

Do not shorten the product designation on quotations, drawings, roll registers or certificates. Polymer family and antioxidant evidence are not interchangeable at the same thickness.

Roll, overlap and evidence controls

Control	Method	Declared KGCL-L value	Verification
Unlaminated receiver-edge width	Direct measurement	300 mm	Every roll
500 mm powder impregnation and three lower-panel cuts	Production record; visual and dimensional inspection	400 g/LM (800 g/m²); 500 mm zone; three continuous lower-panel cuts	Every roll
Opposite fully laminated edge	Visual inspection	One longitudinal edge	Every roll
Roll width / installed advance	Measured / calculated at 300 mm overlap	5.85 m / 5.55 m	Roll label / panel layout
Roll length / mass / wrapping	Measured / weighed / visual	30 m standard; custom by order. Gross mass order-specific. Thin-film/woven wrap for handling and moisture/weather protection	Roll label / delivery inspection
Standard roll core	Production record plus dimensional, visual and bore inspection	Continuous full-length plastic; 5.85 m total axial length; 102 mm nominal clear ID throughout; recyclable where accepted	Order certificate / every roll
Project core options	Order control	Alternative clear-ID plastic core or full-length steel core by order	Approve before manufacture
Lifting design basis	Certified WLL / lifting plan	Mandrel/core prong ≥ 1,000 kg minimum; labelled gross mass governs	Before unloading

Manufacturing assurance and evidence

Evidence area	Current evidence status	Required project action
Factory systems, QC and laboratory	Verified ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 certificates include GCL manufacture in scope. The in-house QC laboratory is currently GAI-LAP listed for 22 methods, including ASTM D5890, D5993, D6496 and D6768.	Maintain current certificates and the GAI method schedule. Laboratory accreditation is method-specific, not product certification.
Order-specific product performance	GCL strength/hydraulic values and laminate polymer, thickness, break strength and OIT are declared by the applicable product code	Confirm on current GCL production and laminate certificates
Dry component mass	Calculated by product code from declared component values	Confirm the exact code; obtain an ASTM D5993 finished-mass result where the project requires measured total mass
Bentonite mineralogy, carbonate, CEC and particle size	Not declared	Obtain separate test evidence if required by project specification
Chemical compatibility and interface shear	Not declared	Test with project liquids, soils and adjacent geosynthetics where material

Technical release pack

Current system certificates and the GAI-LAP scope were reviewed for this issue and shall be retained in the project dossier. The order release pack must also include exact product-code and MQC results, bentonite, geotextile and laminate certificates, 500 mm powder-zone and 400 g/LM application records, lower-panel three-cut QC, roll dimensions, gross mass, packaging and core specification, the roll/lot register and required project tests. ISO and GAI-LAP support the control framework; they do not replace order-specific MQC or conformance testing.

Design, installation and acceptance notes

Project controls

Confirm chemical compatibility and hydration water. The EOR verifies internal and interface shear and cover stability. Confirm the 500 mm powder zone at 400 g/LM and all three lower-panel cuts. Install the fully laminated edge over the receiver without site powder, then confine with approved cover.

Longitudinal overlap system

The lower panel has a 300 mm factory-unlaminated receiver overlap within a 500 mm powder zone applied at 400 g/LM (800 g/m²), extending 200 mm inboard. Place the fully laminated upper edge so its woven underside contacts the exposed lower nonwoven. When hydrated and confined, embedded powder and granular core bentonite migrate upward through three lower-panel cuts. The upper laminate remains continuous. Do not remove film or add site powder at a compliant longitudinal seam.

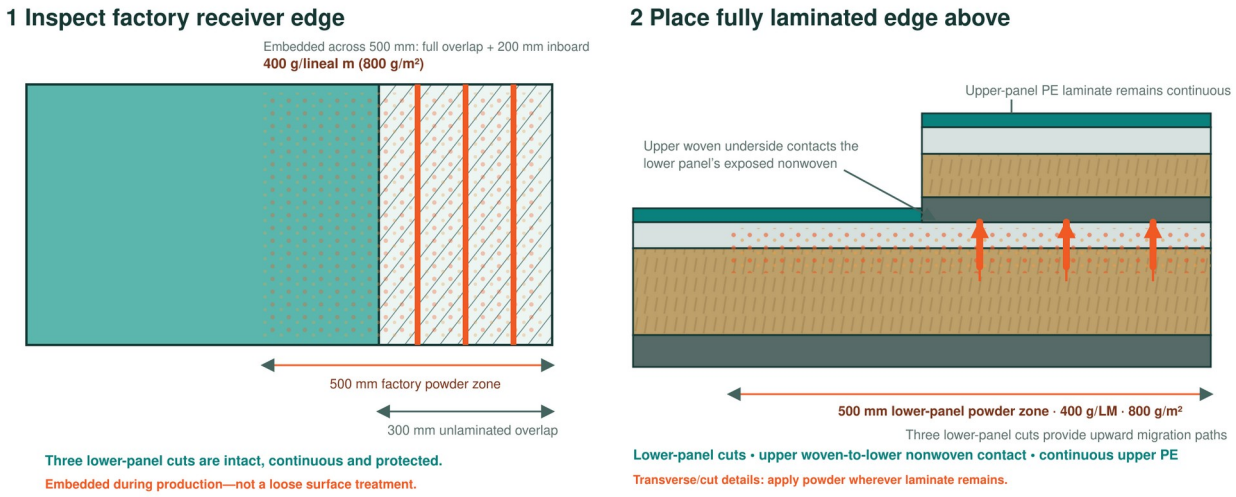

Figure 2. Factory-formed 300 mm receiver edge and completed GCL-to-GCL longitudinal overlap.

Factory edge geometry is a controlled product feature

The full-length 300 mm receiver overlap must remain unlaminated within the 500 mm powder-impregnated lower-panel zone. Confirm 400 g/LM (800 g/m²), 200 mm inboard extension and all three lower-panel cuts. The laminate must terminate cleanly at the overlap boundary. Do not add site powder or alter the edge; quarantine suspected treatment loss or damage.

Transverse and cut-edge overlaps

At roll ends and field-cut edges, the preferred method removes a 300 mm laminate strip from the lower panel without disturbing its upper nonwoven. Apply bentonite powder at 0.5 kg per lineal metre, then shingle the intact fully laminated upper panel over the seam. Where the client and EOR accept a retained-laminate lap, manual powder placement at the same rate is mandatory wherever the lower laminate remains; retained film leaves a possible interfacial flow path and is not direct GCL-to-GCL contact. Provide at least 300 mm of approved soil cover after CQA acceptance.

Product selection

- Use KGCL-L20A only where its 0.20 mm LDPE A-family laminate suits the required barrier function.
- For 0.50 mm and 1.00 mm options, select A, B or C by polymer and antioxidant evidence; thickness alone does not establish equivalence.
- Specify the product code, laminate orientation, roll dimensions, overlap construction, factory receiver-edge treatment, transverse/cut-detail bentonite, acceptance testing and order evidence. Standard roll length is 30 m; custom lengths may be ordered to suit slope runs and reduce transverse seams.
- Confirm contained-liquid compatibility, hydration-water chemistry, slope interfaces, cover, confinement and construction sequence for the actual project system.

References

- Geosynthetic Institute, GRI-GCL3 Rev. 5, Standard Specification for Test Methods, Required Properties, and Testing Frequencies of GCLs. https://geosynthetic-institute.org/grispecs/gcl3.pdf
- GAI-LAP current laboratory method scope, reviewed 10 August 2026. https://geosynthetic-institute.org/gai.htm
- Factory technical data sheet and current ISO 9001, ISO 14001 and ISO 45001 certificates, reviewed 10 August 2026. Kontain technical file

Technical control: GRI-GCL3 is comparison only. Use with the product certificate, current scopes, order MQC and project documents.